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SESSION TRACK 5:

HOW CAN EMERGING TECHNOLOGIES BE INCLUSIVE? INCLUSIVE INNOVATION AND THE CHALLENGES FOR STI POLICY

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Innovation meets sustainable development: A framework for engaged, responsible, and inclusive research

This conference seeks to explore the future of science, technology development, and innovation (STI) by looking at ongoing changes in research and innovation practices and patterns. In this paper, I explore the meaning of inclusive innovation under the paradigm of sustainable development and its consequences for the organization of science–society interaction. I draw on an emerging sustainability science and transdisciplinary practice – especially in global environmental assessments and in long-term North–South research partnerships of the Centre for Development and Environment, University of Bern, Switzerland. With this, I intend to help clarify the concept of inclusive innovation, and thus contribute to several focus areas proposed for Session Track 5. Specifically, I address one of the major challenges in better aligning STI policy with the Agenda 2030 and its 17 SDGs: the organization of engaged, responsible, normative, and inclusive research for sustainable development.

Keywords: Sustainable development, transdisciplinarity, equity, inclusive innovation, multi-stakeholder processes

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Introduction

Inclusive innovation is on the upswing, not only in innovation studies (Fagerberg et al, 2013) but also in both the theory and the practice of poverty- and equity-focused international development cooperation. In STI Policy, inclusive innovation generally means to address not only economic needs but to achieve profitable growth benefiting also the poor. However, unorthodox scholars have observed a very limited interpretation of inclusion, upholding a biased relationship between active innovators and passive beneficiaries. They further have observed a narrow exploitive and often destructive use of innovation (Benneworth et al, 2015; Ott, 2017). Inclusive innovation then is insufficient for countering the development and climate crisis of the Anthropocene, and must be reconsidered in the quest for future STI policy.

Inclusive innovation in international development cooperation has a more fundamental meaning as it calls for equity-based relationships between citizens and science, decision-makers and stakeholders in the generation of knowledge. This has recently been confirmed in the global 2030 Agenda for Sustainable Development, in which global leaders recommit all members of society to join forces in organizing a sustainability transformation (UN, 2015). This Agenda's 17 Sustainable Development Goals (SDGs) are instrumental in implementing and monitoring the transformation of all societal subsystems and achieving a sustainability transformation of the global system. Although innovation is mentioned quite prominently (in SDG 9), innovation concepts have only recently entered international development cooperation thinking and practice, for example in formal R&D programmes. Concepts of inclusion, by contrast, have a much longer tradition in international development cooperation, e.g. participation is an old and fundamental inclusive concept. However, as the ongoing debate illustrates, there is still a lack of more equity-based interaction with stakeholders in development interventions.

Since the turn of the millennium, proponents of sustainable development – especially those coming from the humanities and social sciences – have thus reconsidered such concepts of inclusion and innovation. In sustainability science, which relies substantially on transdisciplinary methodologies, they developed a wealth of conceptual and practical knowledge about equity-based science–society interaction and stakeholder inclusion in development interventions (Patterson et al, 2015). This has brought fundamental progress in the work of development actors seeking to reduce poverty and increase sustainability. Nevertheless, in development practice and debate, inclusion and innovation have reached buzzword status. Unfortunately, omnipresence, and arbitrary and vague usage are common characteristics of originally promising concepts in the field of science, technology and development – not to forget the Rio concept of sustainable development itself. To overcome the resulting inefficiency in development practice and unlock the concepts' transformative potential, clarification is necessary.

In search for common ground

In this conceptual paper, I argue that ongoing changes in theory and practice for sustainable development are highly promising for the future of science, technology development, and innovation (STI) policy, too. Especially, guided by the sustainability paradigm, an emerging sustainability science has developed transdisciplinary concepts and research and innovation practices, which offer ways out of the current widespread confusion, arbitrariness and ineffectiveness in mission-oriented development cooperation and innovation policy. To support this argument, I explore the normative content of inclusive innovation under the paradigm of sustainable development and its consequences for and achievements in the organization of equity-based science–society interaction. Sustainability theory and transdisciplinary practice – especially in global environmental assessments and in long-term North–South research partnerships of the Centre for Development and Environment, University of Bern, Switzerland inform my analysis. As a result, I frame sustainable development as a radically emancipatory concept (Ott and Kiteme, 2016). The rationale behind it is the following: The complexity and uncertainty characterizing the development and climate crises as well as the necessary future-forming processes (Gergen, 2014) require that appropriate responses integrate not only facts, but also values (Schroeder et al, 2016). Consequently, knowledge and innovation for sustainable development are necessarily an outcome of deliberative democratic processes and joint learning among diverse

actors with different knowledge and value systems and diverse understandings of development, or innovation (Dryzek and Stevenson, 2011; Ott, 2017).

This emancipatory construction of sustainable development fundamentally effects the conceptualisation of inclusive innovation. It can provide guidance for STI policy on how to expand its epistemological base and to align with the 2030 Agenda and its 17 SDGs and with other development communities in addressing global challenges of the Anthropocene. Based on this background, I propose a three-fold innovation framework for sustainable development. It covers and integrates three major co-existing innovation paradigms, which interfere with each other and create tensions between development actors. Nevertheless, they are all fundamental in a concerted development approach. Consequently, the organization of engaged, responsible, and inclusive research and innovation processes is central to equity-based science-society interaction for sustainable development.

Innovation at the science-society interface

The organization of transdisciplinary research is per se experimental, and the science–society interaction is affected by self-interests, conflicts, competition, misunderstandings, and inefficiency. My analysis shows that in practice, the organization of inclusive processes between actors with different institutional backgrounds, worldviews, and levels of economic and social power lacks adequate support and conceptual underpinning. Standard planning and budgetary frameworks do certainly not favour it. This is highly problematic in global environmental assessments or in a North–South research context, which are both characterized by multifaceted issues of inequity and disparity. Nonetheless, there are opportunities – and an urgent need – for improvement. I argue that detecting the different actors' understanding of development and innovation along with their specific reference systems is a key issue in knowledge production at the science-society interface. In addition, the integration of diverse actors and concepts into co-production of knowledge and innovation under the frame of sustainable development is mandatory. My analysis lets me distinguish three major conceptual approaches to inclusive innovation in international development cooperation:

(1) A first, most conventional innovation paradigm takes science as frame of reference. Inclusive innovation in such a context consists of scientific and technological achievements that eventually reach and benefit the poor (directly or indirectly). The intense development discourse on science–society interaction, at times, may mask the dominance of this innovation paradigm – and, with it, the monopoly of Northern science and technology as well as a profound trust in economic growth and business model innovation (Foster and Heeks, 2013). Although the role of science in creating today's development and climate crisis is widely acknowledged, the expectation (or hope?) that scientists and researchers are capable of providing and transferring the 'right' knowledge and solutions to decision-makers is widespread throughout both the scientific community and society at large. Most importantly, scientism and technocentrism are deeply ingrained in institutions and standard procedures, including evaluation systems. Scientists are perceived – and are trained to perceive themselves – as value-free fact producers. It is undisputed that disciplinary and technological progress has a crucial role to play in poverty eradication; but this role is insufficient where normative decisions have to be taken on issues that affect us all (Sarewitz, 2015; Schroeder et al, 2016). Nonetheless, the increasing commodification of research, growing pressure to prove its impact, efficiency, and social relevance, and the urgency of global problems are again strengthening the dominance of this conventional innovation paradigm (Warren and Garthwaite, 2015).

(2) The second innovation paradigm centres around interaction between science and society. In the context of this paradigm, inclusive innovation means developing better solutions by combining facts (non-normative knowledge) and values (normative knowledge) in multi-stakeholder processes. Born in the spirit of the 1980s, this innovation paradigm holds that scientists and civil society must communicate to improve the efficiency and effectiveness of development measures, enable evidence-based decision-making, and ensure ethically sound application of knowledge. At first glance, such collaboration between science and society is broadly accepted. It is at the top of the development agenda, and most development actors and institutions – and generally also the innovation community – refer to it when addressing today's grand/global challenges (Kallerud et al, 2013; Benneworth et al, 2015). Promising ways of tackling obstacles and trade-offs at the interfaces between science, society, and policymaking are well-described (van den Hove, 2007; Wiesmann et al, 2011). In practice, however, this paradigm causes misunderstandings, resistance, and conflict, because actors from science, governmental and non-governmental institutions, business, and communities each follow their own rationales or subsystems of reference. Resulting multi-stakeholder processes generally remain open, sectoral and arbitrary, with criteria and measures of evidence and success depending on the different actors' negotiation power. This is illustrated by the climate discourse under the UNFCCC – ostensibly a major field of for science-society interaction –, where power imbalances and conflicts of interest limit

integration of the public and thwart action and equity-based solutions (Dryzek and Stevenson, 2011). While efforts and achievements in public inclusion are increasing, science and technology remain dominant. Certainly, such open multi-stakeholder processes are likewise insufficient for addressing today's global challenges.

(3) A third innovation paradigm takes sustainable development as frame of reference. Although development actors often refer to this paradigm, it is rarely applied in its strong meaning. Key is the inseparability of development and equity in sustainable development. Ethical and equity concerns open the floor for contesting existing power structures and decision-making processes (Biermann et al, 2009; Wiesmann et al, 2011). Based on an emancipatory construction of sustainable development, sustainability scientists have built a radical understanding of inclusive innovation, which integrates, but goes beyond the two insufficient understandings of innovation outlined above. A basic characteristic is that all stakeholders are equal agents of change in the co-production of knowledge and innovation towards the shared goal of sustainable development. Scientists and researchers have a special role in organizing this process. In addition to the provision of scientific knowledge and databases, they produce analytical and communicative tools to inform, structure and facilitate participants' interaction and learning. Visualizing data in process-specific planning and decision-making tools and making them available in knowledge platforms is another major contribution. Certainly, the deliberative capacity of individuals and institutions needs specific attention and generally must be developed and secured for their equal and meaningful inclusion (Dryzek and Stevenson, 2011). In joint research navigation, actors organize reflexive and recursive processes, which are well-suited for integrating different development and innovation paradigms in a fruitful way (Ott and Kiteme, 2016; Ott, 2017). As knowledge producers and brokers, they identify common research needs and approaches; they assess, evaluate, and reuse evidence and innovations; and they organize sequences of disciplinary, interdisciplinary, and transdisciplinary steps, including steps that involve governments, civil society, and business. This procedure replaces unspecific interaction between science and society by integrating actors, knowledge, and value systems in joint learning, and an active and coherent developing and shaping of the context. This fosters evidence-based contextualised knowledge and innovation, and corresponding institutions.

In sum, if taken as a superordinate system of reference that is valid for all actors involved, a strong sustainability paradigm unfolds its integrative and transformative power and open the way out of the confusion that characterizes current development efforts. It implies, and guides the organization of, equity-based and democratic processes of research, learning, and innovation in a specific context. What is fundamentally new in this paradigm is that disciplinary and technological innovation is subordinated to a shared goal outside its traditional rationale. However, in sequences of disciplinary, inter- and transdisciplinary research within a process, innovators from all backgrounds can recognize and secure their part in providing coherent solutions to global challenges. Overall, an innovation paradigm based on a strong conception of sustainable development enables sustainability-oriented actors from all scientific and practical fields to seek consilience (Farley, 2014) and to synchronize differing development agendas and research frameworks on behalf of societal co-production of knowledge and innovation. In this, long-term interaction and partnerships are helpful, if not mandatory. If we are to achieve the SDGs formulated in the Agenda 2030, there is no alternative to such equity-oriented, transdisciplinary, reflexive, and co-evolutionary research and innovation.

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